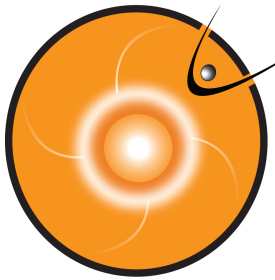


COMMUNITY COORDINATED MODELING CENTER

SPACE WEATHER RESEARCH CENTER

DONKI

Database of Notifications, Knowledge, and Information

M. Leila Mays

Software developers:

Chiu Wiegand (lead), Rick Mullinix

and the CCMC/SWRC team

June 2016

http://kauai.ccmc.gsfc.nasa.gov/DONKI

Feedback and suggestions are welcome!

Email: chiu.wiegand@nasa.gov, m.leila.mays@nasa.gov

SWRC Tools

http://kauai.ccmc.gsfc.nasa.gov/

https://kauai.ccmc.gsfc.nasa.gov/SWRC_Tools.html

NASA GSFC Community Coordinated Modeling Center (CCMC) Tools

CME Scoreboard

Space Weather DONKI

WSA-ENLIL Cone Fast Track

Stereo CAT

Space Weather Web Tools from CCMC/SWRC

SWRC Tools

http://kauai.ccmc.gsfc.nasa.gov/

https://kauai.ccmc.gsfc.nasa.gov/SWRC_Tools.html

NASA GSFC Community Coordinated Modeling Center (CCMC) Tools

CME Scoreboard

Space Weather DONKI

WSA-ENLIL Cone Fast Track

Stereo CAT

Space Weather Web Tools from CCMC/SWRC

Before DONKI

- Blogs for Daily space weather activity
  - Difficult to Search
  - Difficult to describe a chain of events
  - Difficult to disseminate
  - What we want to get away from: http://screencast.com/t/750Ci2aKM
- Static email lists for notifications
  - Manually generated following templates
  - Tedious and Error-prone

DONKI

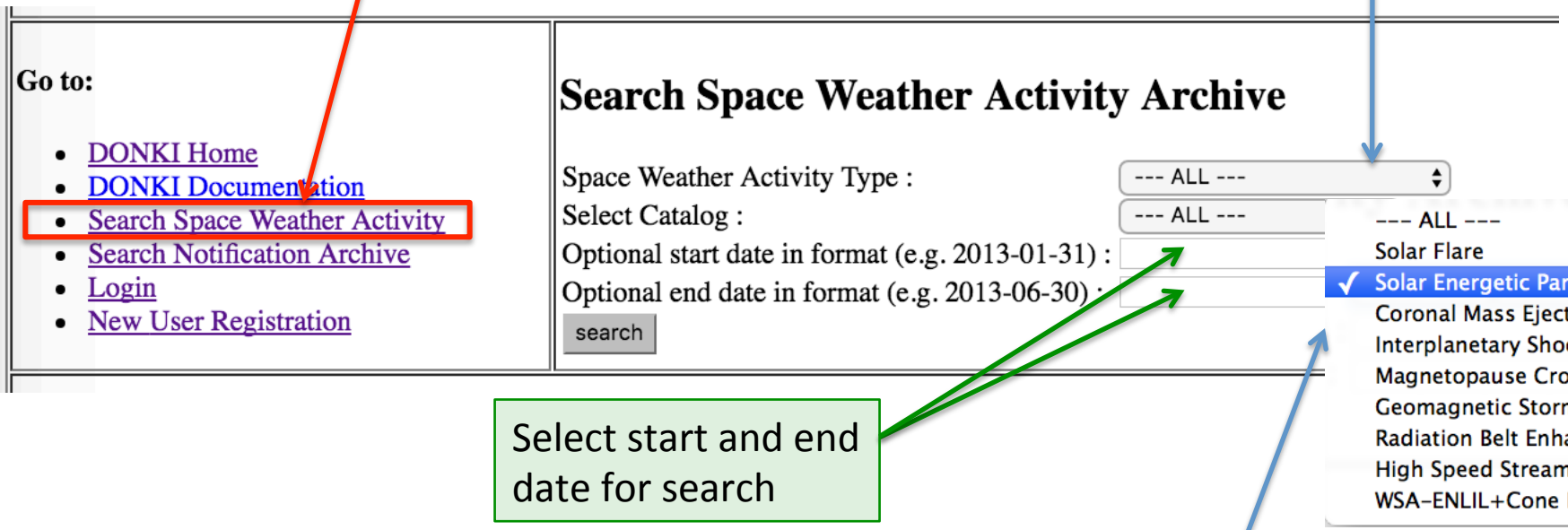
Database of Notifications, Knowledge, and Information

- Catalog of space weather phenomena.
- Chronicles the daily interpretations of space weather observations, simulation results, forecasting analysis, and notifications.
- Key component of the forecaster tool suite, developed to address space weather needs of NASA missions.
- Online tool for dissemination of forecasts, notifications, and archiving event-focused information (automatic dissemination coming soon)
- Intelligent linkages, relationships, cause-and-effects between space weather activities
- Comprehensive search functionality to support **anomaly resolution** and **space science research**:
  - Space weather activity archive (flares, CME parameters and simulation results, SEPs, geomagnetic storms, radiation belt enhancements) with links between activities
  - GSFC space weather notification and weekly report archive
- Enables remote participation by students, world-wide partners, model and forecasting technique developers

Demo: http://kauai.ccmc.gsfc.nasa.gov/DONKI

Click here to get started searching the database by space weather activity type and date

Choose event type



Select start and end date for search

For example, Solar Energetic Particle (SEP), to see all SEP events above threshold values

DONKI

Search Space Weather Activity Archive

Space Weather Activity Type : Solar Energetic Particle

Select Catalog : --- ALL ---

Optional start date in format (e.g. 2013-01-31) : 2013-05-01

Optional end date in format (e.g. 2013-06-30) : 2013-05-31

search

For example, Solar Energetic Particle (SEP), lists all SEP events above threshold values at various locations.

Event Type	Event Time (UT)	Associated Instrument	Directly Linked Event(s)
Solar Energetic Particle	2013-05-13 04:12	STEREO B: IMPACT 13-100 MeV	2013-05-13T01:53:00-FLR-001 FLR Type: X1.6 2013-05-13T02:54:00-CME-001
Solar Energetic Particle	2013-05-13 18:02	STEREO B: IMPACT 13-100 MeV	2013-05-13T15:40:00-FLR-001 FLR Type: X2.8 2013-05-13T16:18:00-CME-001
Solar Energetic Particle	2013-05-15 13:25	GOES13: SEM/EPS >10 MeV	2013-05-15T01:25:00-FLR-001 FLR Type: X1.2 2013-05-15T02:18:00-CME-001
Solar Energetic Particle	2013-05-22 15:05	GOES13: SEM/EPS >10 MeV	2013-05-22T12:30:00-FLR-001 FLR Type: M5.0 2013-05-22T13:24:00-CME-001
Solar Energetic Particle	2013-05-22 15:05	GOES13: SEM/EPS >100 MeV	2013-05-22T12:30:00-FLR-001 FLR Type: M5.0 2013-05-22T13:24:00-CME-001
Solar Energetic Particle	2013-05-22 15:30	SOHO: COSTEP 15.8-39.8 MeV	2013-05-22T12:30:00-FLR-001 FLR Type: M5.0 2013-05-22T13:24:00-CME-001

All columns are sortable! (click column headings)

DONKI

Go to:

- DONKI Home
- DONKI Documentation
- Search Space Weather Activity
- Search Notification Archive
- Login
- New User Registration

Search Space Weather Activity Archive

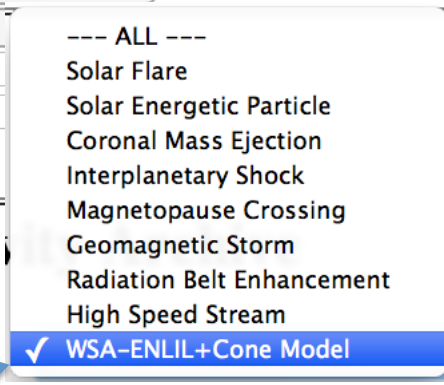
Space Weather Activity Type : --- ALL ---

Select Catalog : --- ALL ---

Optional start date in format (e.g. 2013-01-31) :

Optional end date in format (e.g. 2013-06-30) :

search



For another example, select "WSA-ENLIL+Cone Model" to see all CME simulations in a certain date range.

DONKI

Search Space Weather Activity Archive

Space Weather Event Type : WSA-ENLIL+Cone Model
Optional start date in format (e.g. 2013-01-31) : 2013-05-03
Optional end date in format (e.g. 2013-06-30) : 2013-05-31
search
Generate Report for WSA-ENLIL+Cone Inputs

Selecting "WSA-ENLIL +Cone Model" lists all CME simulations in a certain date range.

All columns are sortable! (click column headings)

Model Name	Model Completion Time	CME Input(s)	Predicted Earth Impact	Predicted Other Location(s) Impact
WSA-ENLIL+Cone	2013-05-03T09:33Z	• CME: 2013-05-02T14:36:00-CME-001(CME Analysis)	No or little impact to Earth.	
WSA-ENLIL+Cone	2013-05-03T18:07Z	• CME: 2013-05-03T18:00:00-CME-001(CME Analysis)	No or little impact to Earth.	Spitzer: 2013-05-06T14:32Z
WSA-ENLIL+Cone	2013-05-04T12:48Z	• CME: 2013-05-03T18:00:00-CME-001(CME Analysis) • CME: 2013-05-03T22:36:00-CME-001(CME Analysis)	No or little impact to Earth.	Spitzer: 2013-05-06T06:39Z STEREO B: 2013-05-06T16:39Z
WSA-ENLIL+Cone	2013-05-04T13:52Z	• CME: 2013-05-03T18:00:00-CME-001(CME Analysis) • CME: 2013-05-03T22:36:00-CME-001(CME Analysis)	No or little impact to Earth.	Spitzer: 2013-05-06T15:31Z
WSA-ENLIL+Cone	2013-05-05T11:58Z	• CME: 2011-05-24T11:24:00-CME-001(CME Analysis)	Earth Shock Arrival Time = 2011-06-01T02:38Z Duration of disturbance (hr) = Minimum magnetopause standoff distance: Rmin(Re) = 6.6 Possible Kp index: (kp)90=1 (kp)135= (kp)180=5	

Search Space Weather Activity Archive

Shows impact prediction summary for each simulation

Space Weather Event Type : WSA-ENLIL+Cone Model
Optional start date in format (e.g. 2013-01-31) : 2013-05-03
Optional end date in format (e.g. 2013-06-30) : 2013-05-31
search
Generate Report for WSA-ENLIL+Cone Inputs

Model Name	Model Completion Time	CME Input(s)	Predicted Earth Impact	Predicted Other Location(s) Impact
WSA-ENLIL+Cone	2013-05-03T09:33Z	• CME: 2013-05-02T14:36:00-CME-001(CME Analysis)	No or little impact to Earth.	
WSA-ENLIL+Cone	2013-05-03T18:07Z	• CME: 2013-05-03T18:00:00-CME-001(CME Analysis)	No or little impact to Earth.	Spitzer: 2013-05-06T14:32Z
WSA-ENLIL+Cone	2013-05-04T12:48Z	• CME: 2013-05-03T18:00:00-CME-001(CME Analysis) • CME: 2013-05-03T22:36:00-CME-001(CME Analysis)	No or little impact to Earth.	Spitzer: 2013-05-06T06:39Z STEREO B: 2013-05-06T16:39Z
WSA-ENLIL+Cone	2013-05-04T13:52Z	• CME: 2013-05-03T18:00:00-CME-001(CME Analysis) • CME: 2013-05-03T22:36:00-CME-001(CME Analysis)	No or little impact to Earth.	Spitzer: 2013-05-06T15:31Z
WSA-ENLIL+Cone	2013-05-05T11:58Z	• CME: 2011-05-24T11:24:00-CME-001(CME Analysis)	Earth Shock Arrival Time = 2011-06-01T02:38Z Duration of disturbance (hr) = Minimum magnetopause standoff distance: Rmin(Re) = 6.6 Possible Kp index: (kp)90=1 (kp)135= (kp)180=5	

Search Space Weather Activity Archive

Space Weather Event Type : WSA-ENLIL+Cone Model
Optional start date in format (e.g. 2013-01-31) : 2013-05-03
Optional end date in format (e.g. 2013-06-30) : 2013-05-31
search
Generate Report for WSA-ENLIL+Cone Inputs

Click here to get full simulation results and graphics for a given run.

Model Name	Model Completion Time	CME Input(s)	Predicted Earth Impact	Predicted Other Location(s) Impact
WSA-ENLIL+Cone	2013-05-03T09:33Z	• CME: 2013-05-02T14:36:00-CME-001(CME Analysis)	No or little impact to Earth.	
WSA-ENLIL+Cone	2013-05-03T18:07Z	• CME: 2013-05-03T18:00:00-CME-001(CME Analysis)	No or little impact to Earth.	Spitzer: 2013-05-06T14:32Z
WSA-ENLIL+Cone	2013-05-04T12:48Z	• CME: 2013-05-03T18:00:00-CME-001(CME Analysis) • CME: 2013-05-03T22:36:00-CME-001(CME Analysis)	No or little impact to Earth.	Spitzer: 2013-05-06T06:39Z STEREO B: 2013-05-06T16:39Z
WSA-ENLIL+Cone	2013-05-04T13:52Z	• CME: 2013-05-03T18:00:00-CME-001(CME Analysis) • CME: 2013-05-03T22:36:00-CME-001(CME Analysis)	No or little impact to Earth.	Spitzer: 2013-05-06T15:31Z
WSA-ENLIL+Cone	2013-05-05T11:58Z	• CME: 2011-05-24T11:24:00-CME-001(CME Analysis)	Earth Shock Arrival Time = 2011-06-01T02:38Z Duration of disturbance (hr) = Minimum magnetopause standoff distance: Rmin(Re) = 6.6 Possible Kp index: (kp)90=1 (kp)135= (kp)180=5	

Full simulation results for the selected run:

CME input parameters are listed for each activity ID (click ID for more CME information)

WSA-ENLIL+Cone Model with Completion Time: 2013-05-04T12:48Z

Model Inputs:

2013-05-03T18:00:00-CME-001 with CME Analysis: Lon.=-89.0, Lat.=18.0, Speed=760.0, HalfAngle=60.0, Time21.5=2013-05-03T22:30Z
2013-05-03T22:36:00-CME-001 with CME Analysis: Lon.=-86.0, Lat.=-18.0, Speed=520.0, HalfAngle=22.0, Time21.5=2013-05-04T05:37Z

Model Outputs:

Earth Impact:
No or little impact to Earth.

Other Location(s) Impact:
Spitzer with estimated shock arrival time 2013-05-06T06:39Z
STEREO B with estimated shock arrival time 2013-05-06T16:39Z

Impact prediction times

Inner Planets Link = http://iswa.gsfc.nasa.gov/downloads/20130503_223000_anim.tim-den.gif
Inner Planets Link = http://iswa.gsfc.nasa.gov/downloads/20130503_223000_anim.tim-vel.gif
Inner Planets Link = http://iswa.gsfc.nasa.gov/downloads/20130503_223000_anim.tim-den-Stereo_A.gif
Inner Planets Link = http://iswa.gsfc.nasa.gov/downloads/20130503_223000_anim.tim-den-Stereo_B.gif
Inner Planets Link = http://iswa.gsfc.nasa.gov/downloads/20130503_223000_anim.tim-vel-Stereo_A.gif
Inner Planets Link = http://iswa.gsfc.nasa.gov/downloads/20130503_223000_anim.tim-vel-Stereo_B.gif
Timelines Link = http://iswa.gsfc.nasa.gov/downloads/20130503_223000_ENLIL_CONE_timeline.gif
Timelines Link = http://iswa.gsfc.nasa.gov/downloads/20130503_223000_ENLIL_CONE_Kp_timeline.gif

Links to simulation movies and plots

DONKI

DONKI also shows intelligent linkages, relationships, cause-and-effects between space weather activities

For example, search for solar flares during May 2013, and click here for more information on the M5.0 flare

Search Space Weather Activity Archive

Space Weather Activity Type : Solar Flare

Optional start date in format (e.g. 2013-01-31) : 2013-05-01

Optional end date in format (e.g. 2013-06-30) : 2013-05-31

search

Event Type	Activity ID	FLR Start Time	Associated Instrument	FLR Peak Time	FLR End Time	Class	Source Location
Solar Flare	2013-05-03T17:29:00-FLR-001	2013-05-03T17:29Z	GOES15: SEM/XRS 1.0-8.0	2013-05-03T17:32Z		M5.7	N15E85
Solar Flare	2013-05-13T01:53:00-FLR-001	2013-05-13T01:53Z	GOES15: SEM/XRS 1.0-8.0	2013-05-13T02:17Z		X1.6	N10E89
Solar Flare	2013-05-13T15:40:00-FLR-001	2013-05-13T15:40Z	GOES15: SEM/XRS 1.0-8.0	2013-05-13T16:05Z		X2.8	N10E89
Solar Flare	2013-05-14T01:00:00-FLR-001	2013-05-14T01:00Z	GOES15: SEM/XRS 1.0-8.0	2013-05-14T01:11Z		X3.2	N10E89
Solar Flare	2013-05-15T01:10:00-FLR-001	2013-05-15T01:10Z	GOES15: SEM/XRS 1.0-8.0	2013-05-15T01:48Z		X1.2	N11E63
Solar Flare	2013-05-22T12:30:00-FLR-001	2013-05-22T12:30Z	GOES15: SEM/XRS 1.0-8.0	2013-05-22T13:38Z		M5.0	N13W75

DONKI

More details and relationships for the M5.0 flare:

Solar Flare
Start Time: 2013-05-22T12:30Z (GOES15: SEM/XRS 1.0-8.0)
Peak Time: 2013-05-22T13:38Z
End Time:
Intensity: M5.0 class
Source region N13W75
Activity ID: 2013-05-22T12:30:00-FLR-001 (version 2)
Note:
Submitted on 2014-02-03T19:49Z by Leila Mays

A Notification with ID 20130522-AL-001 was sent on 2013-05-22T15:30Z

Click the notification ID to see a copy of the flare notification.

All directly linked activities:

- 2013-05-22T13:24:00-CME-001
- 2013-05-22T15:05:00-SEP-001
  GOES13: SEM/EPS >10 MeV
- 2013-05-22T15:05:00-SEP-002
  GOES13: SEM/EPS >100 MeV
- 2013-05-22T15:30:00-SEP-001
  SOHO: COSTEP 15.8-39.8 MeV

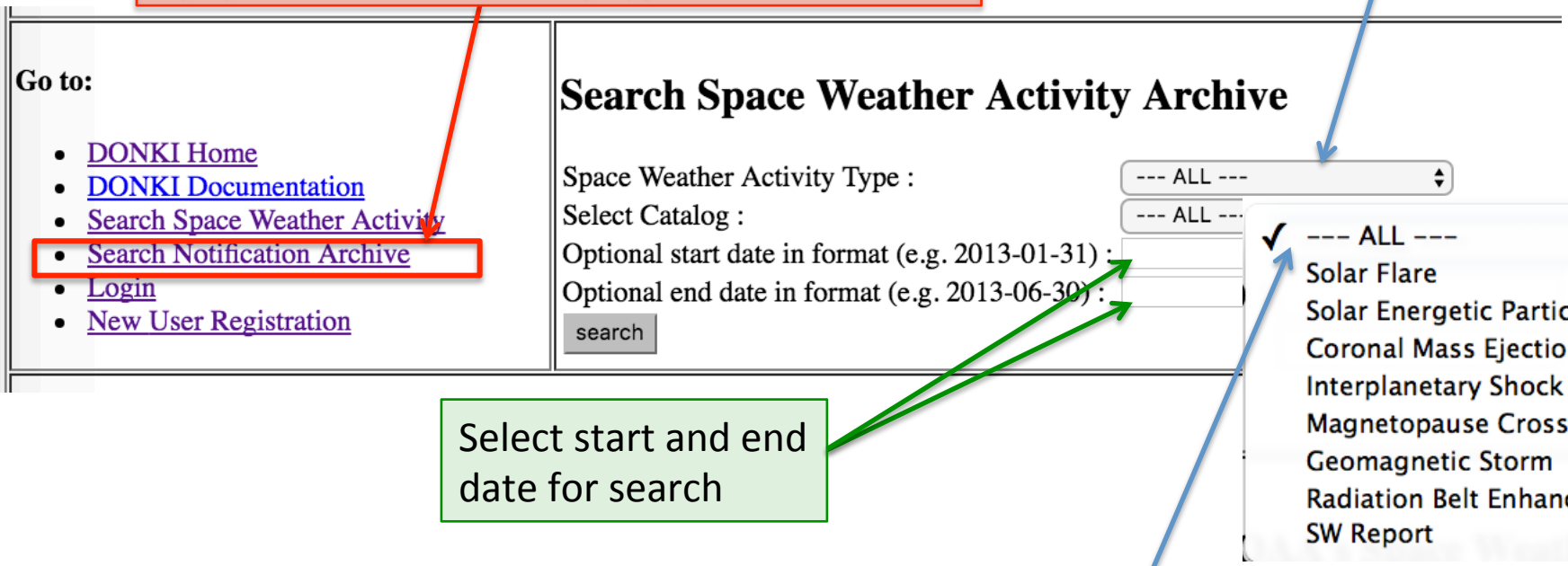
Related events are listed at the bottom. This flare was associated with a CME and also an SEP event near Earth

Click on the activity IDs for information on the CME or SEPs.

DONKI

Alternatively, search the notification database by space weather activity type and date

Choose event type, or weekly report



Select start and end date for search

For example, select ALL to list all notification types and weekly reports.

DONKI

Search Space Weather Notification Archive

Notification for Space Weather Event Type : --- ALL ---

(Optional) Search start date from (e.g. 2013-01-31) : 2013-05-01

(Optional) Search end date to (e.g. 2013-06-30) : 2013-05-14

search

Message ID	Sent Date	For SW Event(s)	Sent By
20130514-AL-003	2013-05-14T04:55Z	CMEAnalysis CME	Dan Comberiate
20130514-AL-002	2013-05-14T03:50Z	CMEAnalysis CME	Dan Comberiate
20130514-AL-001	2013-05-14T01:45Z	FLR	Dan Comberiate
20130513-AL-008	2013-05-13T19:15Z	CMEAnalysis CME	Dan Comberiate
20130513-AL-007	2013-05-13T18:35Z	SEP	Dan Comberiate
20130513-AL-006	2013-05-13T18:20Z	CMEAnalysis CME	Dan Comberiate
20130513-AL-005	2013-05-13T16:25Z	FLR	Dan Comberiate
20130513-AL-004	2013-05-13T06:00Z	CMEAnalysis CME	Dan Comberiate
20130513-AL-003	2013-05-13T05:20Z	CMEAnalysis CME	Dan Comberiate
20130513-AL-002	2013-05-13T04:55Z	SEP	Dan Comberiate
20130513-AL-001	2013-05-13T02:52Z	FLR	Dan Comberiate
20130508-7D-001	2013-05-08T16:06Z	Report	chiu wiegand
20130503-AL-001	2013-05-03T18:20Z	FLR	Dan Comberiate
20130501-7D-001	2013-05-01T22:15Z	Report	chiu wiegand

Selecting ALL lists all notification types and weekly reports in a certain date range.

Click on the message ID to see a copy the notification.

All columns are sortable! (click column headings)

Demo:

DONKI

Database of Notifications, Knowledge, and Information

http://kauai.ccmc.gsfc.nasa.gov/DONKI/

Example: 2013-05-22 M7.3 flare and related activity,
2012-03-07 X5.4 flare.

DONKI - Caveats

- Data entry for past events (using logs and alert archives) was performed by students:
  - Could be errors, mostly due to typos, or duplicate entries
  - We are adding data quality flags to indicate whether entries have been “checked”
  - Entries from Aug 2013 onwards is mostly verified.
- Search filters combinations will be added in the near future
- More data export options coming (suggestions?)

- CME measurements are made in real-time, with limited data.

DONKI
Future Directions

- Search with filters will be added in the near future
- More data export options
- Flags have been added to indicate data quality